

STUDIES IN AUSTRALIAN FISHES.

No. 4. \*

By ALLAN R. McCULLOCH, Zoologist.

(Plates xxix-xxxi., figs. 1-2.)

Family CLUPEIDÆ.

Genus HYPERLOPHUS, *Ogilby*.

*Hyperlophus*, *Ogilby*, Rec. Austr. Mus., ii., 1892, p. 26. *Id.*,  
*Ogilby*, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 505,  
and xxii., 1897, p. 71 (*H. sprattellides*, *Ogilby*).

*Hyperlophus*, subgenus *Omochetus*, *Ogilby*, Proc. Linn. Soc.  
N.S. Wales, xxii., 1897, p. 72 (*H. copii*, *Ogilby*).

This genus has been confused with *Diplomystus*, Cope, a  
genus of fossil Herrings from the United States of America.  
The typical forms of Cope's genus, however, have the dorsal  
scutes pectinate posteriorly, and very different from those of  
the recent species.

HYPERLOPHUS VITTATUS, *Castelnau*.

(Plate xxix., figs. 1, 2.)

*Meletta norwæ-hollandiæ*, *Castelnau*, Proc. Zool. Soc. Vict., i.,  
1872, p. 189 (Not *M. norwæ-hollandiæ*, Cuv. & Val.).

*Meletta vittata*, *Castelnau*, Res. Fish. Austr. (Vict. Offic. Rec.  
Philad. Exhib.), 1875. p. 46 — substitute name.

*Clupea vittata* (*Castelnau*), *Macleay*, Proc. Linn. Soc. N.S.  
Wales, iv., 1879, p. 379, and vi., 1881, p. 259. *Id.*, *Lucas*,  
Proc. Roy. Soc. Vict., (2), ii., 1890, p. 37.

*Clupea* (*Hyperlophus*) *sprattellides*, *Ogilby*, Rec. Austr. Mus.,  
ii., 1892, p. 24.

*Diplomystus sprattellides*, *Ogilby*, Ed. Fish. N.S. Wales, 1893,  
p. 185.

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\* For No. 3, see "Records," ix., 1913, p. 355.

*Hyperlophus sprattellides*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii., 1897, p. 71, and Mem. Qld. Mus., v., 1916, p. 98. *Id.*, Waite, Mem. N.S.Wales Nat. Club, 1904, p. 13. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 27.

*Hyperlophus (Omochetus) copii*, Ogilby, Proc. Linn. Soc. N.S. Wales, xxii., 1897, p. 72, and Ann. Qld. Mus., No. 9. 1908, p. 5, and Proc. Roy. Soc. Qld., xxi., 1908, p. 24. *Id.*, Waite, Mem. N.S.Wales Nat. Club, 1904, p. 13.

*Diplomystus vittatus*, Zietz,<sup>1</sup> Trans. Roy. Soc. S. Austr., xxxii., 1908, p. 295,—*nom. nud.*

*Synonymy.*—The possible identity of *Meletta vittata*, Castelnau, and *Hyperlophus sprattellides*, Ogilby, was suggested by the latter author in 1893, but for reasons which are apparently invalid, he retained his own name in preference to the earlier one of Castelnau. As it seems probable that the two names refer to the same species, I have adopted the name *vittata*.<sup>2</sup>

Having compared the typical specimens of *H. sprattellides* and *H. copii*, together with numerous other specimens in the Australian Museum collection, I regard the two forms as mere variations of the one species. The typical example of *H. sprattellides* (Fig. 2) is much deeper than any other I have seen, but its depth is exaggerated as a result of lateral compression which, in these fishes, follows upon preservation in alcohol. The type of *H. copii* (Fig. 1) on the other hand, is much more slender; it was fixed in formaline, and has retained its natural form better. My series shows the depth to be somewhat variable, as is also the exact position of the ventral fins in relation to the snout and the base of the caudal fin. As all the other characters appear to be identical in the two forms, there seems no reason to retain them as distinct species, and certainly not as distinct subgenera. The identity of the two forms has been recently recognised by Ogilby.

<sup>1</sup> A specimen received for examination from Mr. Edgar R. Waite, Director of the South Australian Museum, is evidently the example on which this name is based. Though associated with a different M.S. name, the data on its label tallies with that published by Zietz, being as follows,—“Encounter Bay, March '86. Cast up on the beach.” The specimen does not differ from the type of *H. sprattelliæ*s.

<sup>2</sup> Ogilby also regarded *M. vittata*, Castelnau, as possibly identical with the common Fresh-water Herring, *Potamalosa*, but it is readily distinguished from that fish by the relative positions of the dorsal and ventral fins.

*Locs.*—The Australian Museum collection includes many specimens from various localities around Sydney, and from Port Stephens and Eden, New South Wales. Two identified by Ogilby as *H. copii* are from Southport, Moreton Bay, Queensland. A number of small specimens, 41-56 mm. long, from Safety Bay, Fremantle, Western Australia, are also apparently this species; they are more slender than larger examples, the depth being 5.4 in the length to the base of the caudal fin, and 1.3 in that of the head, which is 4 in the length; the number of scales and fin-rays do not appear to differ from those of New South Wales specimens.

HYPERLOPHUS TRANSLUCIDUS, *sp. nov.*

(Plate xxix., fig. 3.)

D. 15-16; A. 19-22; P. 10-13; V. 7; C. 19. L. lat. ? Head 4.08 in the length to the base of the tail; depth slightly greater than the length of the head, 3.9 in the same. Eye slightly longer than the snout, 3.3 in the head. Third dorsal ray 1.6, third anal ray 2.5, pectoral 1.6, ventral 2.3 in the head.

Body strongly compressed, the ventral profile much more strongly arched than the dorsal. Scales very deciduous, wanting in the type. Dorsal and ventral serratures well developed; there are sixteen scutes between the occiput and the origin of the dorsal fin, seventeen between the isthmus and the ventrals, and nine more to the vent.

Eye with a narrow adipose lid posteriorly. Nostrils superolateral, close together; the posterior is in the middle of the length of the snout. Maxillary reaching back to below the anterior portion of the eye. Jaws and palate toothless; tongue with minute teeth on the median line. Cheeks, opercles, and nape with a well developed muciferous system, which also extends onto the body behind the scapular bone.

Dorsal fin originating at a point midway between the snout and the base of the caudal, and terminating above the anterior anal ray. Ventrals inserted wholly before the dorsal, and nearer the snout than the base of the caudal.

*Colour.*—The body is translucent in life, with a broad silvery band extending from behind the head to the tail. The back bears some scattered blackish dots which extend on to the dorsal and caudal fins; lips and chin also dotted. Occiput dark brown. A dark spot at the base of each anal ray.

Described and figured from a specimen 58 mm. long. It is one of six of about the same length, which appear to be very similar, though some are slightly narrower than the type. They are readily distinguished from *H. sprattellides* by the forward position of the anal fin, which commences beneath the termination of the dorsal.

*Loc.*—Sans Souci, Botany Bay, New South Wales. Taken in a prawn-net by Mr. J. H. Wright.

Genus POTAMALOSA, *Ogilby*.

POTAMALOSA NOVÆ-HOLLANDIÆ (*Cuvier and Valenciennes*), *Günther*.

(Plate xxix; fig 4.)

? *Meletta novæ-hollandiæ*, *Cuvier and Valenciennes*, *Hist. Nat. Poiss.*, xx., 1847, p. 376. *Id.*, *Castelnau*, *Res. Fish. Austr.* (*Vict. Offic. Rec. Philad. Exhib.*), 1875, p. 46.

*Clupea novæ-hollandiæ*, *Günther*, *Brit. Mus. Cat. Fish.*, vii., 1868, p. 431. *Id.*, *Macleay*, *Proc. Linn. Soc. N.S.Wales*, iv., 1879, p. 379, and vi., 1881, p. 259. *Id.* *Ogilby*, *Cat. Fish. N.S.Wales*, 1886, p. 56.

*Clupea (Hyperlophus) novæ-hollandiæ*, *Ogilby*, *Rec. Austr. Mus.*, ii., 1892, p. 26.

*Diplomystus novæ-hollandiæ*, *Ogilby*, *Ed. Fish. N.S.Wales*, 1893, p. 184, pl. xlvii (bad).

*Potamalosus novæ-hollandiæ*, *Ogilby*, *Proc. Linn. Soc. N.S.Wales*, xxi., 1897, p. 505. *Id.*, *Waite*, *Mem. N.S.Wales Nat. Club*, 2, 1904, p. 13. *Id.*, *Stead*, *Ed. Fish. N.S.Wales*, 1908, p. 26. *Id.*, *Cockerell*, *Mem. Qld. Mus.*, iii., 1915, p. 37.

*Potamalosus antiqua*, *Ogilby*, *Proc. Linn. Soc. N.S.Wales*, xxii., 1897, p. 70.

*Clupea richmondia*, Macleay, Proc. Linn. Soc. N.S.Wales, iv., 1879, p. 380; and vi., 1881, p. 259. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 56.

The original notice of *Meletta novæ-hollandiæ* is very brief, and the details given differ somewhat from those of the common fresh-water Herring of New South Wales. It will therefore be necessary to examine the types in the Paris Museum before their identity can be established, but until this is done, we can conveniently follow Günther in accepting the name *novæ-hollandiæ* for our species.

This Herring is so far known only from the coastal rivers of New South Wales.<sup>3</sup> It occurs in small schools in the Hastings River, and is most plentiful in the faster-running waters below the numerous "falls" or rapids. It rises readily to a small artificial fly. Specimens secured in this way during the latter part of March, 1916, and measuring about eight inches long, were found to contain well-developed milt and roe.

The specimen figured measures 177 mm. from the snout to end of the middle caudal rays, and was taken in fresh water in the Hastings River.

### Family PLESIOPIDÆ

#### Genus TRACHINOPS, Günther.

#### TRACHINOPS CAUDIMACULATUS, McCoy.

*Trachinops caudimaculatus*, McCoy, Prodr. Zool. Vict., Dec. xx., 1890, pl. cxciv. *Id.*, Hall, Proc. Roy. Soc. Tasm., 1912, p. 83.

*Trachinops tenuatus*, Hall, Proc. Roy. Soc. Tasm., 1911, p. 32 (not *T. tenuatus*, Günther).

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<sup>3</sup> Kent included the names *C. novæ-hollandiæ* and *C. richmondi* in a list of Queensland fishes (Gt. Barrier Reef, 1893, p. 370), but further proof of the occurrence of this species in the northern State is required. Mr. J. Douglas Ogilby informs me that he has been unable to obtain any evidence of its existence there, and is of the opinion that it does not extend beyond the New South Wales border. Castelnau's record of *Meletta novæ-hollandiæ* from Victoria (Proc. Zool. Soc. Vict., i., 1872, p. 189) properly applies to *Hyperlophus vittatus*,—see p. 163



*Pseudochromis rodwayi*, Johnston, Abstract of Proceedings, Roy. Soc. Tasm., April, 1902, p. 6.

When in Hobart in 1914, I was enabled to examine the type of *Pseudochromis rodwayi* which is preserved in the Tasmanian Museum. It was in very bad condition, but a comparison of it with a well-preserved specimen of *T. caudimaculatus* left no doubt as to the identity of the two. The differences in the number of fin rays and spines as given by McCoy and Johnston are accounted for by the shrivelled condition of the latter author's specimen.

*T. caudimaculatus* has been recently recognised from Tasmania by Hall.

#### Family CHEILODIPTERIDÆ

##### GENUS GLOSSAMIA, Gill.

*Glossamia* Gill. Proc. Acad. Nat. Sci. Philad., 1863, p. 82. (*Apogon aprion*, Richardson). [Not *Glossamia*, Goode & Bean, Oceanic Ichthyology, 1895, p. 231.]

*Mionorus*, Krefft, Proc. Zool. Soc., 1867, p. 942 (*M. lunatus*, Krefft). [Not *Mionorus*, Jordan & Evermann, Bull. U.S. Fish. Comm., xxiii., 1905, p. 210, and Jordan & Seale, Bull. U.S. Fish. Bur., xxv., 1906, p. 247.]

*Gulliveria*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 45 (*G. fusca*, Castelnau).

*Glossamia* was founded by Gill upon *Apogon aprion*, Richardson, which is a fresh-water species confined to Northern Australia. It was later used for a deep-water fish, *G. paulionis*, from the Atlantic by Goode and Bean, but that species is not congeneric with Gill's type.

*Mionorus*, Krefft, was also based on a fresh-water fish, *M. lunatus*, from New South Wales, but it has since been wrongly used to accommodate marine species of the same family by several American authors. I have compared Krefft's type, which is preserved in the Australian Museum, with the specimens here identified as *Glossamia aprion*, and find the differences between them to be of specific value only.

*Gulliveria* is evidently also identical with *Glossamia*.<sup>4</sup> Castelnau's definition applies very well to *Gl. aprion*, when due allowance is made for the errors common to that author's writings. It may be noted also that Ogilby has recorded *Gl. aprion* from the Norman River, whence the types of *Gulliveria* were obtained.

The genus may be defined as follows :—

Fluviatile Cheilodipterids with a compressed and somewhat elevated body. Cranium with large cavities above covered by membrane. Mouth large; maxillary with a supplementary bone. Villiform teeth on the jaws, vomer, and palatines; a minute patch on the tongue. Preopercular borders smooth or with a few serrations below; operculum unarmed. Gill-rakers few, about six free, the anterior ones sessile. Body with moderate, ciliated scales; cheeks and opercles scaly. Lateral line complete. Dorsal spines and rays about vi. i/10; anal about ii/9.

*Glossamia* differs from *Amia* and its allies in the structure of the gill-rakers, and in having lingual teeth; the operculum also is unarmed.

GLOSSAMIA APRION, *Richardson*.

(Fig. 1.)

*Apogon aprion*, Richardson, Ann. Mag. Nat. Hist., ix., 1842, p. 16.

*Apogonichthys aprion*, Günther, Brit. Mus. Cat. Fish., i., 1859, p. 247. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 347.

*Gulliveria fusca*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 45. *Id.*, Macleay, *Loc. cit.*, p. 349.

*Gulliveria fasciata*, Castelnau, *Loc. cit.*, p. 46. *Id.*, Macleay, *Loc. cit.* p. 349.

*Gulliveria ramsayi*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 11.

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<sup>4</sup> I am indebted to Mr. J. D. Ogilby for directing my attention to the probable identity of *Gulliveria* and *Glossamia*.

*Glossamia aprion*, Ogilby, Mem. Qld. Mus., iii., 1915, p. 134.

D. vi. i/10; A. ii/9-10; V. i/5; P. 12; C. 17; l. lat. 41-43; l. tr.  $4\frac{1}{2}$ /1/13-14. Depth 2.4-2.6 in the length from the premaxillary symphysis to the hypural, and equal to the length of the head without the opercular lobe. Orbit a little longer than the snout, 3-3.6 in the head; interorbital space 1.5-1.9 in the eye. Second dorsal spine 2.2-2.6, and depth of caudal peduncle 2.3-2.5 in the head.

Body compressed, moderately elevated. Upper profile of head slightly concave, the snout obliquely truncate anteriorly; behind the occiput the body rises in a more or less pronounced curve to the dorsal fin, it being more arched in larger than in smaller specimens. Mouth oblique, maxillary extending to below the hinder orbital margin in adults, not so far in the young; lower jaw much longer than the upper. Preopercular margins smooth, the lowermost with a few obscure serrations; operculum unarmed, produced into a pointed lobe posteriorly. Suprascapular exposed, its edge smooth or crenulate. Teeth villiform, depressible, in broad bands on the jaws, a few near the symphyses slightly enlarged; a narrow angular band on the vomer, and a very narrow, elongate band on each palatine; a very small patch of minute teeth on the posterior part of the tongue. Lower limb of first gill-arch with six free gill-rakers, of which the longest is less than half as long as the eye.

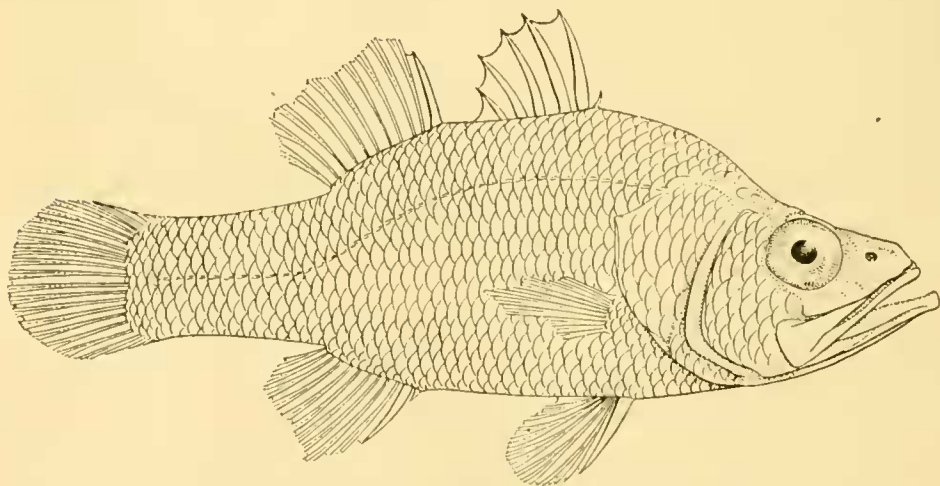


Fig. 1.—*Glossamia aprion*, Richardson.



Scales of the body with ciliated edges, those of the head cycloid; they extend forward to the occiput above, and cover the cheeks and opercles. Lateral line following the curve of the back from the suprascapular to the hypural, and consisting of a simple tube on each scale.

Relative positions of the fins slightly variable, due to changes of the form of the body with growth. First dorsal spine small, inserted a little behind the vertical of the base of the pectorals; second spine long and strong. Second dorsal fin with a strong spine. Ventrals inserted in advance of the pectorals, each with a strong spine. Anal with two spines, the first very small; its origin and termination are behind the same points of the second dorsal.

*Colour*.—After long preservation, uniform, the membrane of the outer half of the first dorsal blackish; the membrane between the ventral rays is also dark.

Described from three specimens, 77-109 mm. long, from the snout to the hypural; the largest is figured. They do not differ from Richardson's description of *Apogon aprion*, and also agree with that of *Gulliveria ramsayi*, Macleay<sup>5</sup>; they also scarcely differ from Castelnau's diagnosis of *Gulliveria fusca*, so I regard these three as synonymous. *Gu. fasciata*, Castelnau, which was taken with *Gu. fusca*, only differs from that species in being rather more elongate, in having the preoperculum somewhat serrated, and in its colour marking; all these characters are variable in the allied *Gl. gillii*, however, so I have no hesitation in regarding *Gu. fasciata* as another synonym of *Gl. aprion*.

*Loc*.—Collect's Creek, fifty miles inland from Port Darwin, North Australia.

GLOSSAMIA GILLII, *Steindachner*.

(Pl. xxxi., fig. 4.)

*Apogonichthys gillii*, Steindachner, Sitzb. Akad. Wiss. Wien, Iv. i., 1867, p. 11, pl. i., fig. 1. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 347, and viii., 1883, p. 200.

<sup>5</sup> The type of *Gu. ramsayi* is apparently lost. I am unable to find it in either the Macleay Museum or the Australian Museum collections.

*Apogon gillii*, Günther, Ann. Mag. Nat. Hist. (4), xvii., 1876, p. 392.

*Mionorus lunatus*, Krefft, Proc. Zool. Soc., 1867, p. 942.

*Mionurus gillii*, Ogilby, Mem. Qld. Mus., ii, 1913, p. 92.

A good series of twelve specimens, 42-113 mm. long, is preserved in the Australian Museum from Eidsvold, Queensland. The variation in the fin-rays and scales of twelve specimens is as follows:—D. vi. i/9-10; A. ii/8-9; l. lat. 25-31. The proportions of two specimens 111 and 42 mm. long are respectively:—Depth 2.4-2.8 in the length from the premaxillary symphysis to the hypural; head, without the opercular lobe, 2.5-2.4 in the same; eye 4.1-3.1, snout 3.2-4.2 and interorbital space 4.2-4.6 in the head; second dorsal spine 2.7-2.2, and caudal fin 1.4-1.7 in the head. *Colour*.—Brown with numerous larger and smaller irregular spots and blotches of darker brown; a dark bar extends backward from the eye to the shoulder, and all the head is more or less spotted; an interrupted band below the anterior dorsal spines, and another between the soft dorsal and anal fins, while there are several irregular patches on the caudal peduncle; membrane of the outer half of the spinous dorsal very dark, that of the other fins greyish, the soft dorsal and anal with their bases lighter.

These specimens only differ from my description of *G. aprion* in having fewer scales on the lateral line. The figure represents an example from Eidsvold 111 mm. long.

A careful comparison of one of Krefft's specimens of *Mionorus lunatus* from the Cox River, with those described above does not reveal any important differences between them, and indicates that it is only a local variation of *G. gillii*.

*Locs*.—Eidsvold, Burnett River, Queensland; coll. Dr. T. Bancroft. Lillesmere Lagoons, Burdekin River, Queensland; coll. A. Morton. Cox River, New South Wales; co-type of *M. lunatus*, coll. E. K. Cox.

## Family LUTIANIDÆ.

Genus APRION, *Curier and Valenciennes*.APRION ROSEUS, *Castelneau*.

(Plate xxx.)

*Aphareus roseus*, Castelneau, Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 373.

*Aprion microlepis* (Bleeker) Ogilby, Mem. Qld. Mus., v., 1916, p. 182.

D. x/11. A. iii/8. P. 16. V. i/5. C. 17. L. lat. 64-66; l. tr.  $7\frac{1}{2}/1/16$ . Depth before the ventrals 3.3 in the length to the base of the tail; head 3.2-3.4 in the same. Eye 4.6-4.7 in the head, 1.4-1.5 in the snout, and 1.3-1.4 in the interorbital space. Preorbital width 1.3-1.5 in the eye. Snout 3.02-3.2, interorbital space 3.3 in the head. Fourth dorsal spine 2.3, first dorsal ray 2.9, pectoral fin 1.06, and ventral fin 1.2-1.3 in the head.

Eye placed well below the profile of the head, the interorbital space very convex; its length is much less than that of the snout, and is only about one-third greater than its distance from the preorbital margin. Nostrils close together, nearer the eye than the end of the snout, the anterior with a free dermal lobe. Maxillary naked, reaching a little beyond the vertical of the anterior orbital margin. Cheek with seven rows of scales, operculum with about ten; three and a half rows on the temporal region. Naked surfaces of the upper portion of the head, snout, preopercular limb, and mandible covered with minute pits and muciferous canals. Preopercular margin finely serrated posteriorly, the serrae enlarged on the angle which is produced slightly backward. Some rather strong canines anteriorly in each jaw, which become smaller on the sides; behind these is a band of villiform teeth which extends onto the sides of the upper jaw, but is confined to the front in the lower. A broad triangular patch of villiform teeth on the vomer, and a narrow elongate patch on each palatine. Suprascapular serrated.

Scales finely ciliated, extending onto the bases of the caudal and pectoral fins. No enlarged axillary ventral scale. Lateral line a little arched anteriorly, thence straight to the base of the caudal; it is formed of simple tubules.

Dorsal fin originating behind the vertical of the ventrals: its spines are slender, the fourth the longest, the others decreasing evenly backward; anterior ray subequal in length to the last spine, the others becoming shorter backward to the penultimate one, the last being produced. Third anal spine longest, a little shorter than the first ray; soft anal similar to the dorsal. Pectoral falcate, the fifth ray longest, not quite reaching the vertical of the vent. Anterior ventral ray produced, not reaching quite so far back as the pectorals. Caudal deeply forked.

*Colour.*—Pearly pink above, silvery below; the basal part of each scale of the back and sides bluish, the margin golden. Upper part of head deep pink, preorbital and snout violet pink, the whole stencilled with small yellow and blue lines. Spinous dorsal hyaline blue basally with ill-defined yellow vermiculating lines on the membrane; upper half of the fin hyaline pink, changing to yellow towards the margin; the markings of the soft dorsal are similar, but the yellow vermiculations change into two rows of orange spots posteriorly. Caudal light pink, the outer rays darker. Pectoral pale yellow. Ventrals and anal white. Iris golden.

Described from two specimens 390-410 mm. long, measured from the snout to the end of the middle caudal rays. They are perhaps identical with *A. microlepis*, Bleeker,<sup>6</sup> from which they differ principally in having the eye much smaller and the preorbital broader. These characters doubtless alter with age, and as my specimens are much larger than those described by Bleeker, they perhaps represent merely the adult form of his species.

*Loc.*—Both these specimens were secured by Inspector Smithers in the city fish markets, whence they were dispatched from Byron Bay, New South Wales.

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<sup>6</sup> Bleeker—Atlas Ichth., viii., 1876-77, p. 78, pl. cccxxvi., fig. 5.

## Family SCORPIDIDÆ.

Genus SCORPIS, *Cuvier and Valenciennes.*

*Scorpis*, Cuvier and Valenciennes, Hist. Nat. Poiss., viii., 1831, p. 503 (*S. georgianus*, Cuv. and Val.). *Id.*, Günther, Brit. Mus. Cat. Fish., ii., 1860, p. 63. *Id.*, Vaillant, Bull. Mus. Hist. Nat., iii., 1897, p. 84.

*Agenor*, Castelnau, Proc. Linn. Soc. N. S. Wales, iii., 1879, p. 371 (*A. modestus*, Cast.). *Id.*, Vaillant, *Loc. cit.*, p. 86.

*Neptotichthys*, Hutton, Trans. N. Zeal. Inst., xxii., 1890, p. 278 (*N. violaceus*, Hutton).

*Cesiosoma*, Kaup, Nederl. Tijdschr. Dierk., i., 1864, p. 161 (no type; later called *U. sieboldi*, Blkr.).

*Definition.*—Body compressed, somewhat elevated or oblong-ovate. Preopercle serrated. Body and greater part of head covered with rather small, ctenoid scales. Jaws with bands of teeth, and an outer, more or less enlarged series; patches of minute teeth present on the vomer, palatines, pterygoids and tongue. One dorsal with nine or ten spines increasing in length backwards, and twenty-four to thirty rays. Anal with three spines and twenty-four to thirty rays. Soft portions of the vertical fins scaly, the spinous portion with a scaly sheath; seven branchiostegals. Pseudobranchiae present. Air-bladder present. Pyloric appendages in large numbers.

*Key to the Australian species:—*

- a. Body deep, the depth more than half the length. Soft dorsal and anal fins strongly produced anteriorly.
  - b. Body with darker cross-bands.....*georgianus*.
- aa. Body narrower, the depth half or less than half the length. Soft dorsal and anal fins not or only slightly produced anteriorly. Body without darker cross-bands.
  - c. About as many rays in the dorsal as in the anal fin.
    - d. Scales smaller, more than 100 above the lateral line. Maxillary as broad as its distance from the eye.....*equipinnis*.
    - dd. Scales larger, less than 100 above the lateral line. Maxillary broader than its distance from the eye.
      - e. Anal rays equal to or more numerous than those of the dorsal. Interorbital space less convex, eye larger.....*lineolatus*.
      - ee. Anal rays less numerous than those of the dorsal. Interorbital space very convex, eye smaller.....*violaceus*.
  - cc. Dorsal with thirty, anal with twenty-three rays.....*oblungus*.



*Cesiosoma*.—*S. aequipinnis* and *S. lineolatus* have been separated from *Scorpis* under the name *Cesiosoma*, but they appear to me to be congeneric with *S. georgianus*; the only major difference between these species lies in the general form of the body, which is scarcely of generic value. According to Troschell<sup>7</sup>, the name *Cesiosoma* was proposed for a Japanese fish which had no specific name: Bleeker<sup>8</sup> later called it *C. sieboldi*, which name should apparently stand as the type of the genus, and which he regarded as probably synonymous with *C. aequipinnis*. I am indebted to Professor D. S. Jordan for a copy of Bleeker's definition, and he notes that he knows of no fish of this type from Japan. It therefore appears that *Cesiosoma sieboldi* is not a Japanese fish but is synonymous with *Scorpis aequipinnis*, and that *Cesiosoma* is not distinct from *Scorpis*.

SCORPIS GEORGIANUS, *Cuvier and Valenciennes*.

*Scorpis georgianus*, Cuvier and Valenciennes, Hist. Nat. Poiss., viii., 1831, p. 503, pl. cexlv. *Id.*, Richardson, Ichth. "Erebus and Terror," 1848, p. 121. *Id.*, Günther, Brit. Mus. Cat. Fish., ii., 1860, p. 64. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, LXXX. i., 1879, p. 364. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 397. *Id.*, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), p. 111, and 1890 (1891), p. 30. *Id.*, Waite, Rec. Austr. Mus., vi., 1905, p. 64.

D. x./24-25. A. iii/25-26. P. 16-17. V. i./5. C. 17. Body elevated, the depth before the anal fin 1.6-1.8 in the length to the hypural joint; head 3.3-3.4 in the same. Eye 3.6-3.8 in the head. Second dorsal ray 0.07-1.2 longer than the head. Second anal ray about as long as the head. Profile markedly convex above the eye. Mandible long and narrow, reaching to below the middle of the pupil, and scarcely broader than its distance from the eye. Outer row of teeth much larger than the others. Scales rather small, about eighty-five series above the lateral line between its origin and the hypural joint; about twenty scales between the

<sup>7</sup> Troschell—Arch. Naturg., 1863.

<sup>8</sup> Bleeker—Arch. Néerl. Sc. Nat., xi., 1876, p. 299, and Verh. Akad. Amsterdam, xviii., 1879, p. 8.

*base* of the anterior dorsal rays and the lateral line, and about the same number between the base of the pectoral and the ventral spine. Dorsal and anal fins strongly produced anteriorly. Brown with two broad darker cross-bands, the first below the spinous dorsal and the second between the anterior portions of the soft dorsal and anal.

This definition is based upon two specimens 187 and 277 mm. long from the snout to the end of the middle caudal rays. One is from Albany, and the other from Fremantle, south-western Australia.

*Distribution.*—South-western Australia. Johnston doubtfully records the species from Tasmania.

SCORPIS ÆQUIPINNIS, *Richardson*.

(Fig. 2.)

*Scorpis æquipinnis*, Richardson, Ichth. "Erebus and Terror," 1848, p. 121. *Id.*, Günther (part), Brit. Mus. Cat. Fish., ii., 1860, pp. 64, 518, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 58.

D. ix-x/25 (-27). A. iii/25-26. P. 18. V. i/5. C. 17. Depth at the ventrals 2.1 in the length to the hypural joint; head 3.5 in the same. Eye 4, second dorsal ray and second anal ray 1.6 in the head. Upper and lower profiles subequal, that above the eye evenly convex. Mandible long and rather narrow, reaching to below the anterior border of the pupil, its width subequal to its distance from the eye. Outer row of teeth in each jaw considerably larger than the others. Scales small; more than one hundred series above the lateral line between its origin and the hypural joint; about eighteen between the *base* of the second dorsal ray and the lateral line, and more than 20 between the base of the pectoral and the ventral spine. Dorsal and anal fins produced anteriorly. Colouration uniform.

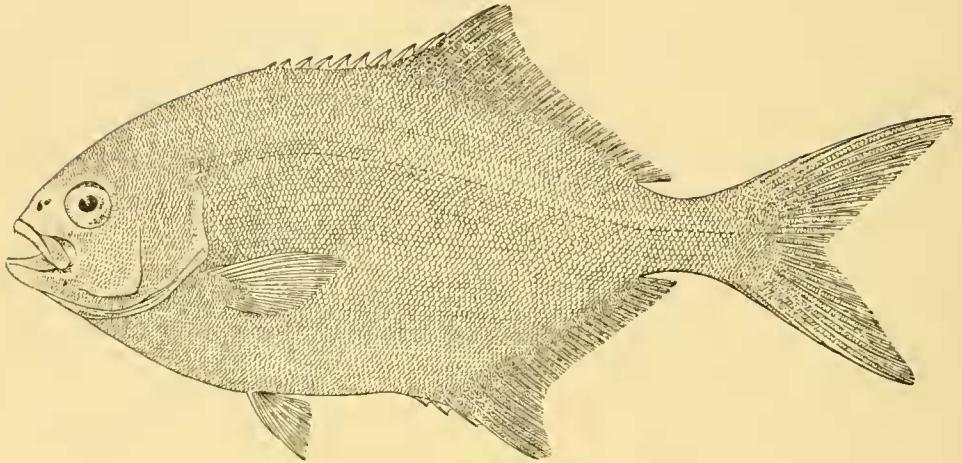


Fig. 2.—*Scorpis æquipinnis*, Richardson.

This definition is based upon a large example, 323 mm. long from the snout to the end of the middle caudal rays, from near Fremantle, Western Australia. A second slightly larger specimen is in the Australian Museum from Adelaide, South Australia.

*Distribution*.—South and South-western Australia.

SCORPIS LINEOLATUS, Kner.

*Scorpis lineolatus*, Kner, Reise "Novara," Zool., i., Fische, pt. 1, 1865, p. 108, pl. v., fig. 3.

*Scorpis æquipinnis*, Günther, Brit. Mus. Cat. Fish., ii., 1860, p. 64 (part). *Id.*, Bleeker, Nederl. Tijdschr. Dierk., ii., 1865, p. 70. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, liii. i., 1866, p. 436, and lvi. i., 1867, p. 334. *Id.*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 376. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 397. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 17, and Ed. Fish. N.S.Wales, 1893, p. 38, pl. x. *Id.*, Waite, Mem. N.S.Wales Nat. Club, 1904, p. 35. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 79 (Not *S. æquipinnis*, Richardson).

*Cesiosoma æquipinnis*, Waite, Mem. Austr. Mus., iv., 1899, p. 84. *Id.*, Ogilby, Proc. Roy. Soc. Qld., xxi., 1908, p. 25.

*Scorpius richardsonii*, Steindachner, Sitzb. Akad. Wiss. Wien, liii. i., 1866, p. 437, pl. v., fig. i.

*Agenor modestus*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1879, pp. 350, 371. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 368. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 12. *Id.*, Vaillant, Bull. Mus. Hist. Nat., iii., 1897, p. 86.

D. x/25-27. A. iii/27-29. P. 18. V. i/5. C. 17. Proportions of a specimen 257 mm. long from the snout to the end of the middle caudal rays:— depth at the ventrals 2.2 in the length to the hypural joint, head 3.7 in the same; eye 3.7, second dorsal ray 2.1, and second anal ray 1.9 in the head. Upper and lower profiles subequal, that above the eyes not evenly convex, but oblique on the snout, and convex on the nape. Mandible shorter and broader than in *S. equipinnis*, not reaching to below the pupil, its width much greater than its distance from the eye. Outer series of teeth not so strong as in *S. equipinnis*. Scales larger, in about ninety series above the lateral line between its origin and the hypural joint; about fifteen between the base of the anterior dorsal rays and the lateral line, and about thirteen between the base of the pectoral and the ventral spine. Dorsal and anal fins not produced anteriorly, the anal with more rays than the dorsal. Colouration uniform.

This definition is based on four adult specimens from New South Wales.

This species has been confused with *S. equipinnis* but may be readily distinguished by its much larger scales on the breast, and the broader maxillary. The profile of the snout is also different in the two species, and the dorsal and anal fins are differently formed.

*Distribution*.—New South Wales and Southern Queensland.

#### SCORPIUS VIOLACEUS, Hutton,

*Ditrema violacea*, Hutton, Trans. N. Zeal. Inst., v., 1873, p. 261, pl. viii., fig. 31 b.

*Neptotichthys violaceus*, Hutton, *Loc. cit.*, xxii., 1890, p. 278.  
*Id.*, Waite, Proc. Linn. Soc. N.S.Wales, xxii., 1898,  
 p. 685.

*Scorpis violaceus*, Waite, Mem. N.S.Wales Nat. Club, 1904,  
 p. 35.

D. x./27-29. A. iii./25-27. P. 19. V. i./5. C. 17.  
 Proportions of a specimen 221 mm. long from the snout to  
 the end of the middle caudal rays: depth 2.3 in the length  
 to the hypural, head 3.7 in the same; eye 3.6, second dorsal  
 ray 1.8, and second anal ray 1.6 in the head. Upper and  
 lower profiles subequal, that above the eye evenly convex.  
 Mandible broad, reaching to or nearly to below the anterior  
 margin of the pupil; its width much greater than its  
 distance from the eye. Outer series of teeth not much larger  
 than the others. Scales moderate, about 89 series above the  
 lateral line between its origin and the hypural joint; about  
 twelve between the *base* of the anterior dorsal rays and the  
 lateral line, and about fifteen between the base of the pectoral  
 and the ventral spine. Dorsal and anal fins not produced  
 anteriorly, though the first three or four anal rays are a little  
 longer than the succeeding ones. Colouration uniform.

This species is distinguished from *S. lineolatus* by the  
 much more convex profile of the head, and in having fewer  
 rays in the anal than in the dorsal. The much broader  
 maxillary and the larger scales separate it from *S.*  
*equipinnis*.

Seven adult examples are in the Australian Museum from  
 Norfolk and Lord Howe Islands. Waite has recognised the  
 species from near Sydney, but the specimen on which his  
 record was based cannot now be found.

*Distribution*.—New Zealand to Norfolk Island, Lord Howe  
 Island, and New South Wales.

#### SCORPIS OBLUNGUS, *Canestrini*.

*Scorpis oblungus*, Canestrini, Arch. per la Zool. Anat. Fisiol.,  
 (2), i., 1869, p. 153.



D. ix./30. A. iii./23. Height below the origin of the soft dorsal, three in the length without the caudal; head four in the same. Eye  $3\frac{1}{2}$  in the head. Dorsal and anal fins not produced anteriorly.

This species has not been recognised since it was originally described. The number of rays in the dorsal and anal fins, as given by Canestrini, distinguishes it from any species of *Scorpis* known to me. The type was said to have been obtained in Australia.

### Family MONODACTYLIDÆ.

Genus SCHUETTEA, *Steindachner*.

SCHUETTEA SCALARIPINNIS, *Steindachner*.

*Schuettea scalaripinnis*, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 449, pl. vi., fig. 1. *Id.*, Günther, Zool. Rec., 1866, p. 141. *Id.*, McCulloch, Zool. Res. "Endeavour", i., 1911, p. 81, pl. xv.

*Scorpis boops*, Peters, Monatsb. Akad. Wiss. Berlin, 1866, p. 521. *Id.*, Günther, *Loc. cit.*

*Scorpis boops*, Peters, has drifted into the synonymy of *S. æquipinnis*, Richardson, to which it bears no resemblance. It is identical with *Schuettea scalaripinnis*, Steindachner, as noted by Günther.

Steindachner's paper appeared almost simultaneously with that of Peters, but the actual date of publication is unknown to me. The former was "read" on 8th March, 1866, and the latter on 23rd July, 1866.

### Family KYPHOSIDÆ.

Genus KYPHOSUS, Lacépède.

KYPHOSUS CINERASCENS, *Forsk.*

*Pimelepterus cinerascens* (Forsk.) Bleeker, Atlas Ichth., ix., 1877, p. 15, pl. cccxlv., fig. 4. *Id.*, Ogilby, Mem. Qld. Mus., ii., 1913, p. 90.

*Scorpis vinosa*, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1879, p. 277, pl. ix., fig. 2.

The type of *Scorpis vinosa* is a young *Kyphosus*, and apparently identical with *K. cinerascens*. It has eleven instead of ten dorsal spines as described, and 12 rays, the anterior of which are much higher than the spines. Anal with three spines and eleven rays.

Macleay's specimen was collected at Darnley Island, Torres Strait, while *K. cinerascens* has recently been recorded from the same locality by Ogilby.

#### Family POMACENTRIDÆ.

Genus GLYPHISODON, Lucépède.

GLYPHISODON NIGRIFRONS, Macleay.

*Glyphidodon nigrifrons*, Macleay, Proc. Linn. Soc. N.S.Wales, viii., 1883, p. 271.

The type of this species is preserved in the Australian Museum, with its original label, and is evidently authentic. It differs from Macleay's brief description in having thirteen instead of eleven anal rays, in having the interorbital space only slightly wider than the orbit instead of nearly twice as wide, and in showing three dark bands which are similar to those of *G. curacao*, Bloch.

A careful comparison of it with examples of *G. curacao* proves it to be similar to that species in all its characters except those relating to the anterior portion of the head. The type has the interorbital space somewhat wider, the snout shorter, and the preorbital bone broader than the others, suggesting that it is abnormal in these details. If this be admitted, it cannot be separated from *G. curacao*.

*Loc.*—South-eastern coast of New Guinea.

## Family SCOMBRIDÆ.

Genus GYMNOSARDA, Gill.

GYMNOSARDA ALLETTERATA, Rafinesque.

*Little Tunny ; Bonito.*

*Gymnosarda alletterata* (Rafinesque), Jordan & Evermann, Bull. U.S. Fish. Comm., xxiii. i., 1905, p. 173, fig. 65—synonymy.

*Thynnus affinis* (Cantor), Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 556.

Two fine examples, 710 and 745 mm. long, were forwarded to the Australian Museum by Mr. C. H. Gorrick. He secured them on a rod out of an enormous shoal, while trolling a gar-fish bait at the entrance to Port Stephens, New South Wales. The fish were so numerous that the movements of the shoal "lashed the surface of the water into foam."

This species was recorded from Port Jackson by Macleay in 1881, since which time it has not been recognised in Australian waters until rediscovered by Mr. Gorrick.

## Family GOBIIDÆ.

The three Gobies here described and figured do not enter the typical genus *Gobius* in its restricted form. It is probable that new subdivisions will be found necessary to accommodate them, but as I am unable to refer to many of those already defined, it is better to leave them in abeyance until a revision of the Australian species can be undertaken.

(GOBIUS) EREMIUS, Zietz.

(Plate xxxi. ; fig. 1.)

*Gobius eremius*, Zietz., Rept. Horn. Sci. Exped., ii., 1896, p. 180, pl. xvi., fig. 5.

Br. 5 ; D. vi, 9-10 ; A. 8-9 ; C. 15-16 ; P. 13 ; V. i, 5. Depth 4.7 in the length to the hypural joint ; head 3.3 in the same. Diameter of the eye equal to the length of the snout, 4.3 in the head.

General form robust, depressed anteriorly, compressed posteriorly. Head large and tumid, entirely naked and without raised glandular ridges; chin without barbles. Top of head flat, snout rounded, the interocular space much greater than the eye diameter. Mouth rather large, a little oblique, the maxillary reaching to below the middle of the eye. Each jaw with three rows of small simple teeth, which are fixed and subequal in size; palate smooth. Tongue rounded in front, adnate to the floor of the mouth. Shoulder-girdle without cutaneous flaps. Gill-openings wide, but with a broad interspace between them.

Scales mostly cycloid, finely ciliated behind the pectorals. They are rather irregularly arranged, and are smallest anteriorly, becoming larger on the caudal peduncle. They extend forward to above the operculum, leaving a naked space on the nape backward to the first dorsal spine; breast naked, as is a space behind the pectorals and the bases of the dorsal and anal fins. There are about thirty-six to forty-six scales from behind the middle of the pectoral to the caudal fin, and about thirteen or fourteen between the soft dorsal and the anal.

First dorsal commencing above the middle of the pectoral; its spines are short, the fourth the longest, and much shorter than the rays: third dorsal ray longest, the succeeding rays decreasing slightly backwards. Anal commencing under the third, and terminating beneath the last dorsal ray; its rays increase in length to the second last. Ventrals small, inserted in advance of the pectorals; they are completely united and have a broad basal membrane. Pectorals rounded, the median rays longest, without free silk-like rays; their bases are very broad. Caudal more or less rounded, the lower rays sometimes worn shorter than the upper ones.

*Colour.*—Light brown after long preservation in spirit, with about six darker cross-bars on the back, which unite with others on the sides, leaving whitish interspaces between them. Head mottled with brown; a dark bar on the cheek from below the eye. Spinous dorsal dark brown, blackish posteriorly, with a broad white intramarginal band; soft dorsal

brown with darker mottling, and the margin white. Anal brown with a white margin. Caudal with irregular rows of dark spots. Pectorals more or less brown with a lighter basal bar.

Described from four specimens selected from a series of thirteen, 25-58 mm. long. The example figured is 53 mm. long.

I have failed to determine which, if any, of the numerous subdivisions of *Gobius* will accommodate this species.

*Loc.*—Strangways Springs, Lake Eyre Basin, South Australia.

(GOBIUS) LIDWILLI, *sp. nov.*

(Plate xxxi. ; fig. 2.)

D. vi. 7 ; A. 7 ; P. 14 ; V. i-5 ; C. 13-14. Scales 24. Depth 5 in the length to the base of the tail ; head 3.3 in the same. Eye 2.5 in the head. Third dorsal ray 1.7, fourth anal ray 1.8 in the head.

General form robust, cylindrical anteriorly, compressed posteriorly. Head rather broad and flattened above, the interorbital space much narrower than the very large eye. Snout short, rounded anteriorly. Head entirely naked, with a few minute and very indistinct rows of pores on the sides. Mouth small, very oblique, the maxillary reaching to below the anterior portion of the eye. Each jaw with simple and apparently fixed teeth, which appear to be arranged in two rows anteriorly ; vomer and palatines toothless. Tongue broadly rounded, and not adnate to the floor of the mouth anteriorly. Gill-openings wide, but with a broad interspace between them. Free edge of the shoulder girdle smooth, without cutaneous lobes or tubercles.

Scales large, strongly ctenoid, and subequal in size. There are about twenty-four between the operculum and the base of the tail, and about eight between the origin of the soft dorsal and the anal. They extend forward to the operculum above, and to behind the pectoral and ventral fins below, leaving the breast and nape bare.



First dorsal fin rounded, the third spine longest, but much shorter than the highest ray; the sixth is widely separated from the others. Soft dorsal rather angular, most of its rays bifid, the third the longest. The anal commences slightly farther back than the second dorsal, and though less angular, is similar in form. Pectoral rounded, all its rays simple, and none of them free; the medium rays reach back to below the origin of the soft dorsal. Caudal truncate, its outer rays simple, the others bifid. Ventrals large and wholly united, with a broad basal membrane; its rays are branched, and the longest reach back to the first anal ray.

*Colour.*—Translucent green, with darker cross-bars and blackish spots. There are about seven bars across the back, with others corresponding to them on the ventral surface; both these are connected with intermediate lateral spots. Head with numerous spots and bars; a broad band from below the eye across the cheek. Anterior portion of the first dorsal black, the remainder transparent (orange in life). Soft dorsal, anal, pectoral, and caudal fins each with a large basal spot.

Described and figured from a specimen  $15\frac{1}{4}$  mm. or  $19/32$  of an inch long. It is one of the largest of many specimens which do not appear to differ from each other in their general characters. Though so small, they are apparently adult, since the dissection and microscopical examination of their reproductive organs indicates the presence of ova. Further, the black and orange colour-marking of the dorsal fin in life is more striking than the imperfect colouration common to young fish.

This minute goby, which, if adult, bears the distinction of being one of the smallest vertebrates<sup>9</sup>, occurs in shoals along the oyster-covered rocks in the salt-water reaches of Cowan Creek, near Sydney. It remains within a few feet of the shore, and may be obtained in quantity with a small scoop-net. It is evidently carnivorous, since a small crustacean was observed in the stomach of one dissected. My attention was first drawn to this species by Dr. Mark C. Lidwill, who observed it while in the quest of somewhat larger game, and it is therefore associated with his name.

<sup>9</sup> Jordan—Guide Study of Fishes, ii., 1905, p. 467.

I am unable to refer the species to any of the subdivisions of *Gobius* known to me. It bears a striking resemblance to some of the equally small species of the Eleotrid genus *Eviota*, Jenkins<sup>10</sup>.

*Loc.*—Saltwater reaches of Cowan Creek, near Sydney.

(GOBIUS) AUSTRALIS, *Ogilby*.

(Plate xxxi.; fig. 3.)

*Gillichthys australis*, *Ogilby*, Proc. Linn. Soc. N.S.Wales, (2), ix., 1894, p. 367.

*Generic characters.*—Head and body strongly compressed. Body covered with large, ctenoid scales, which extend forward to the nape above, and cover the breast and base of the pectoral below; there are from twenty-eight to thirty between the operculum and the tail. Operculum with a few large scales, the rest of the head naked; a few rows of minute pores on the sides of the head, and some larger open pores on the upper surface and preopercular margin. Mouth large, the maxillary reaching to behind the eye in females, farther back in males. Upper jaw with three or four pairs of canines anteriorly, followed by a narrow band of smaller teeth which extend along the sides and become uniserial posteriorly; mandibular symphysis crowded with larger teeth, including canines, the sides with a single series of smaller ones; all the teeth are simple and fixed: palate toothless. Tongue rounded and free from the floor of the mouth anteriorly. Gill-openings wide, separated by a rather narrow interspace; gill-membranes forming a fold across the isthmus. Free edge of shoulder-girdle smooth or with a single indistinct tubercle. No barbels.

Ventrals united, free from the belly, with one spine and five rays. Pectorals without free rays. Dorsals separate, the first with six spines; second dorsal and anal short, with about seven or eight rays. Caudal rounded, not elongate.

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<sup>10</sup> Jenkins—Bull. U.S. Fish. Comm., xxii., 1903, p. 501.

This species has been placed in *Gillichthys* by Ogilby, but it has no affinity with that genus. It differs from *G. mirabilis*, Cooper<sup>11</sup>, in its compressed body and large scales, while the maxilla is not produced beyond the mouth opening.

The accompanying figure is prepared from a beautifully preserved example 47 mm. long, which is one of three collected by Mr. J. H. Wright of the Australian Museum.

*Loc.*—Sans Souci, Botany Bay, New South Wales.

Addendum.

Family LUTIANIDÆ.

PARACÆSIO PEDLEYI, *McCulloch and Waite.*

*Paracæsius pedleyi*, McCulloch and Waite, Trans. Roy. Soc. S. Austr., xl., 1916, p. 440, pl. xlii.

An example, 240 mm. long from the snout to the end of the middle caudal rays, was recently secured by Inspector Smithers in the Sydney markets. It differs from the larger type specimen in having the upper profile of the head less tumid; the eye is larger, 3.4 in the head, and the canine teeth are less developed; it also lacks the dark band which crosses the body from the back to the abdomen in the type. Two other larger examples from Lord Howe Island show that these differences are merely due to age.

*Loc.*—Supposed to have been taken near Byron Bay, New South Wales.

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<sup>11</sup> Jordan—Guide Study of Fishes, ii., 1905, p. 463, fig. 419.